

WHAT IS CLAIMED IS:

1. A total air temperature probe for measuring total air temperature, the probe comprising:

an inlet scoop which receives airflow from free stream airflow, the free stream airflow moving toward the inlet scoop from a first direction;

a main exit channel through which a first portion of the airflow entering the inlet scoop exits from the probe;

a TAT sensor flow passage extending longitudinally along an axis, the axis being oriented to form an angle  $\theta$  with the first direction from which the free stream airflow moves toward the inlet scoop, the angle  $\theta$  being between about 35 degrees and about 65 degrees; and

a sensor assembly extending longitudinally in the sensor flow passage and configured to measure a total air temperature of airflow through the sensor flow passage.

2. The probe of claim 1, wherein the angle  $\theta$  is between about 35 degrees and 60 degrees.

3. The probe of claim 2, wherein the angle  $\theta$  is between about 35 degrees and about 55 degrees.

4. The probe of claim 3, wherein the angle  $\theta$  is about 45 degrees.

5. The probe of claim 1, and further comprising a flow separation bend positioned between the inlet scoop and the main exit channel, the flow separation bend diverting a second portion of the airflow entering the inlet scoop into the TAT sensor flow passage.

6. The probe of claim 1, wherein the flow separation bend includes a heated inner elbow wall forming a curved surface between the inlet scoop and a first wall of the sensor flow passage, the inner elbow wall having a plurality of bleed holes vented to an external air passage such that a pressure differential exists, enabling control of a boundary layer of air adjacent to the inner elbow wall.

7. The probe of claim 6, wherein the curved surface of the inner elbow wall ends at a point of intersection between the inner elbow wall and the first wall of the sensor flow passage.

8. The probe of claim 7, wherein a tangent to the curved surface of the inner elbow wall at the point of intersection forms an angle  $\phi$ , with the first wall of the sensor flow passage, of less than 90 degrees.

9. The probe of claim 1, wherein the probe is mounted on an aircraft surface.

10. The probe of claim 9, wherein the aircraft surface is an aircraft engine surface.

11. A total air temperature probe for measuring total air temperature, the probe comprising:

- an inlet scoop which receives airflow from free stream airflow, the free stream airflow moving toward the inlet scoop from a first direction;

- a main exit channel through which a first portion of the airflow entering the inlet scoop exits from the probe;

- a TAT sensor flow passage having first and second walls and extending longitudinally along an axis;

- a sensor assembly extending longitudinally in the sensor flow passage and configured to measure a total air temperature of airflow through the sensor flow passage; and

- a flow separation bend positioned between the inlet scoop and the main exit channel, the flow separation bend including a heated inner elbow wall forming a curved surface which ends at a point of intersection between the inner elbow wall and the first wall of the sensor flow passage, wherein a

tangent to the curved surface of the inner elbow wall forms an angle  $\phi$ , with the first wall of the sensor flow passage, of less than 90 degrees.

12. The probe of claim 11, wherein the inner elbow wall has a plurality of bleed holes vented to an external air passage such that a pressure differential exists, enabling control of a boundary layer of air adjacent to the inner elbow wall.

13. The probe of claim 11, wherein the axis along which the TAT sensor flow passage extends longitudinally is oriented such that it forms an angle  $\theta$  with the first direction from which the free stream airflow moves toward the inlet scoop, the angle  $\theta$  being less than 90 degrees.

14. The probe of claim 13, wherein the angle  $\theta$  is less than about 80 degrees.

15. The probe of claim 14, wherein the angle  $\theta$  is between about 35 degrees and about 65 degrees.

16. The probe of claim 15, wherein the angle  $\theta$  is between about 35 degrees and about 60 degrees.

17. The probe of claim 16, wherein the angle  $\theta$  is between about 35 degrees and about 55 degrees.

18. The probe of claim 17, wherein the angle  $\theta$  is about 45 degrees.

19. The probe of claim 11, wherein the probe is mounted on an aircraft surface

20. The probe of claim 19, wherein the aircraft surface is an aircraft engine surface.